

Claims:

1. A purified and isolated DNA sequence characterized in that said DNA sequence encodes a peptide or protein having phytase activity.
2. A purified and isolated DNA sequence according to Claim 1, further characterized in that said sequence is derived from a microbial source.
3. A purified and isolated DNA sequence according to Claim 1, further characterized in that said sequence is derived from a fungal source.
4. A purified and isolated DNA sequence according to Claim 1, further characterized in that said sequence is derived from an Aspergillus source.
5. A purified and isolated DNA sequence according to Claim 1, further characterized in that said sequence is derived from an Aspergillus ficuum or an Aspergillus niger source.
6. A purified and isolated DNA sequence according to Claim 1, further characterized in that said sequence encodes a phytase which exhibits the following characteristics:
  - a) provides a single band at 85 kDa on SDS-PAGE when expressed in an Aspergillus host;
  - b) has an apparent molecular weight after deglycosylation in the range of about 48 - 56.5 kDa;
  - c) has a specific activity of about 100 U/mg protein.
7. A purified and isolated DNA sequence characterized in that said sequence exhibits at least one of

the following characteristics:

- a) hybridizes to an oligonucleotide probe derived from the DNA sequence as disclosed in Figure 6;
- b) hybridizes to an oligonucleotide probe derived from the cDNA sequence as disclosed in Figure 8.

8. An expression construct characterized in that a DNA sequence according any one of claims 1-7 is operably linked to a regulatory region capable of directing the expression of a protein or peptide having phytase activity in a suitable expression host.

9. The expression construct of Claim 8 further characterized in that the regulatory region also contains a secretory leader sequence providing for the secretion of the expressed protein or peptide having phytase activity.

10. The expression construct of Claim 9 characterized in that the AG promoter is used to direct the expression of the protein or peptide having phytase activity.

11. The expression construct of Claim 10 further characterized in that a homologous phytase leader sequence is used to provide for the secretion of the expressed protein or peptide having phytase activity.

12. The expression construct of Claim 10 further characterized in that the 18 amino acid AG leader sequence is used to provide for the secretion of the expressed protein or peptide having phytase activity.

13. The expression construct of Claim 10 further characterized in that the 24 amino acid AG leader sequence is used to provide for the secretion of the expressed

protein or peptide having phytase activity.

14. The expression construct of Claim 9 characterized in that a homologous phytase promoter is used to direct the expression of the protein or peptide having phytase activity.

15. The expression construct of Claim 14 further characterized in that a homologous phytase leader sequence is used to provide for the secretion of the expressed protein or peptide having phytase activity.

16. The expression construct of Claim 14 further characterized in that the 18 amino acid AG leader sequence is used to provide for the secretion of the expressed protein or peptide having phytase activity.

17. The expression construct of Claim 14 further characterized in that the 24 amino acid AG leader sequence is used to provide for the secretion of the expressed protein or peptide having phytase activity.

18. A vector capable of transforming a host cell characterized in that said vector contains an expression construct according to any one of Claims 8 to 17.

19. A vector according to Claim 18, further characterized in that said vector is a plasmid.

20. A vector according to Claim 18, further characterized in that said vector is a plasmid selected from the group consisting of pAF 28-1, pAF 2-2S, pAF 2-2, pAF 2-3, pAF 2-4, pAF 2-6, pAF 2-7, p18FYT3, p24FYT3 and pFYT3.

21. A transformed host cell characterized in that said host cell is transformed with a vector according to any

one of Claims 18 to 20.

22. A transformed host cell according to Claim 21, which is selected from the group consisting of bacteria, yeasts and fungi.

23. A transformed host cell according to Claim 22, which is selected from the group consisting of Aspergillus, Trichoderma, Penicillium, Mucor, Bacillus, Kluyveromyces and Saccharomyces.

24. A transformed host cell according to Claim 22, which is selected from the group consisting of Aspergillus niger, Aspergillus ficuum, Aspergillus awamori, Aspergillus oryzae, Trichoderma reesei, Mucor miehei, Kluyveromyces lactis, Saccharomyces cerevisiae, Bacillus subtilis and Bacillus licheniformis.

25. A process for the production of a peptide or protein having phytase activity, characterized in that a transformed host cell according to any one of Claims 21 to 24 is cultured under conditions conducive to the production of said peptide or protein having phytase activity.

26. A peptide or protein having phytase activity, characterized in that said peptide or protein having phytase activity is produced by a process according to Claim 25.

27. A phytase characterized in that the phytase exhibits the following characteristics:

- a) provides a single band at 85 kDa on SDS-PAGE when expressed in an Aspergillus host;
- b) has an apparent molecular weight after deglycosylation in the range of about 48 - 56.5 kDa;
- c) has a specific activity of about 100 U/mg protein.

28. A feed for animals characterized in that said feed contains a peptide or protein having phytase activity according to either of Claims 26 and 27.

29. Use of a peptide or protein having phytase activity according to either of Claims 26 and 27 for the conversion of phytate to inositol and inorganic phosphate.

30. A process for promoting the growth of animals characterized in that an animal is fed a diet which is comprised of a feedstuff supplemented with a phytase according to either of claims 26 and 27.

31. A process for the reduction of levels of phytate in animal manure characterized in that an animal is fed a diet which is comprised of a feedstuff supplemented with a phytase according to either of claims 26 and 27 in an amount effective in converting phytate contained in the feedstuff to inositol and inorganic phosphate.